

**Pre Calculus**  
**3.3A CW/HW**

**Name:**  
**Date:**

Use the properties of logarithms to expand each expression. When possible, use the log values in the table below to solve for a single numerical value. You may use your calculator to check your work, but you should be able to do each problem with on the properties and the table.

Values truncated at ten-thousandth	
log2	0.3010
log3	0.4771
log4	0.6020
log5	0.6989
log6	0.7781
log7	0.8451
log8	0.9031
log9	0.9542

If possible, try to solve each problem at least two different ways...

1.  $\log(54)$

2.  $\log(15)$

3.  $\log\left(\frac{6}{14}\right)$

4.  $\log(24)$

$$5. \log\left(\frac{2^4}{5}\right)$$

$$6. \log\left(\frac{6}{5}\right)^6$$

For questions 7 - 12, condense each expression to a single logarithm. Do not evaluate.

$$7. \log 3 - \log 8$$

$$8. \frac{\log 6}{3}$$

$$9. 4\log 3 - 4\log 8$$

$$10. \log 2 + \log 11 + \log 7$$

$$11. \log 7 - 2\log 12$$

$$12. \frac{2\log 7}{3}$$

For questions 13 - 16, expand or condense as much as possible.

$$13. \log(xyz^2)$$

$$14. \log(\sqrt[3]{xyz})$$

$$15. \ln x - 4\ln y$$

$$16. 2(\log 2x - \log y) - (\log 3 + 2\log 5)$$